CHARGE AIR SYSTEM WITH TURBOCHARGER

SAFETY PRECAUTIONS

CAUTION: When performing repair work, especially due to the confined conditions in the engine compartment, pay attention to the following:

- **Route all types of hoses/lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.**
- **Ensure sufficient clearance to all moving or hot components.**

Observe following if test and measuring instruments are required during a road test:

- Test and measuring instruments must be secured to rear seat and operated by an assistant from this location.

If test and measuring instruments are operated from front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

RULES FOR CLEANLINESS

When working on exhaust gas turbocharger, pay careful attention to the following rules:

- Thoroughly clean all unions and adjacent areas before disconnecting.
- Place parts that have been removed on a clean surface and cover. Do not use fluffy cloths!
- Carefully cover opened components or seal if repairs cannot be performed immediately.
- Only install clean components:

  Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).

- Only unpack and remove protective caps immediately prior to installation.
- Clean oil from connection pieces and hose ends when repairing.
- When the system is open:

  Do not work with compressed air if this can be avoided. Do not move vehicle unless absolutely necessary.

TURBOCHARGER SYSTEM COMPONENTS, REMOVING AND INSTALLING

Observe safety precautions, See **CHARGE AIR SYSTEM WITH TURBOCHARGER** .

Observe rules for cleanliness, See **RULES FOR CLEANLINESS** .

- Hoses are secured by clamps or retaining clips.
- For installing the spring-type clips, assembly tool VAS 5024 A is recommended.
- Charge air hoses and lines connections must be free of oil and grease before reinstalling.
- Do not install hoses with lubricants, moisten hose only with water, if necessary.
- Charge air system must be free of leaks.
- Fill turbocharger with engine oil through oil connection before connecting the oil supply line
- Allow the engine run for approx. 1 minute at idling speed after having installed the turbocharger and do not do not rev up immediately. This ensures the lubrication of the turbocharger.
- Replace self-locking nuts.

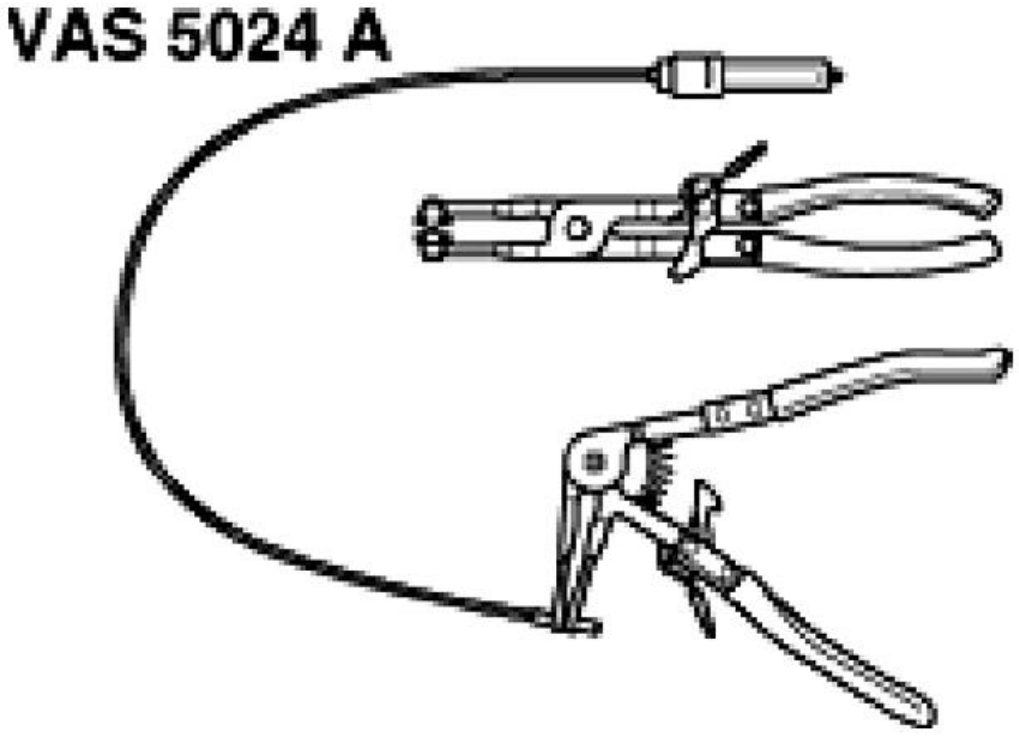

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Fig. 1: Identifying VAS 5024 A Assembly Tool
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Hoses with quick release coupling

NOTE: All hoses of the charge air system are secured with hose clips or with quick release couplings. When using quick release couplings the following points must be observed:

- Unlock quick release coupling by pulling securing clamp (arrow). Separate hose/tube without assistance of tools.

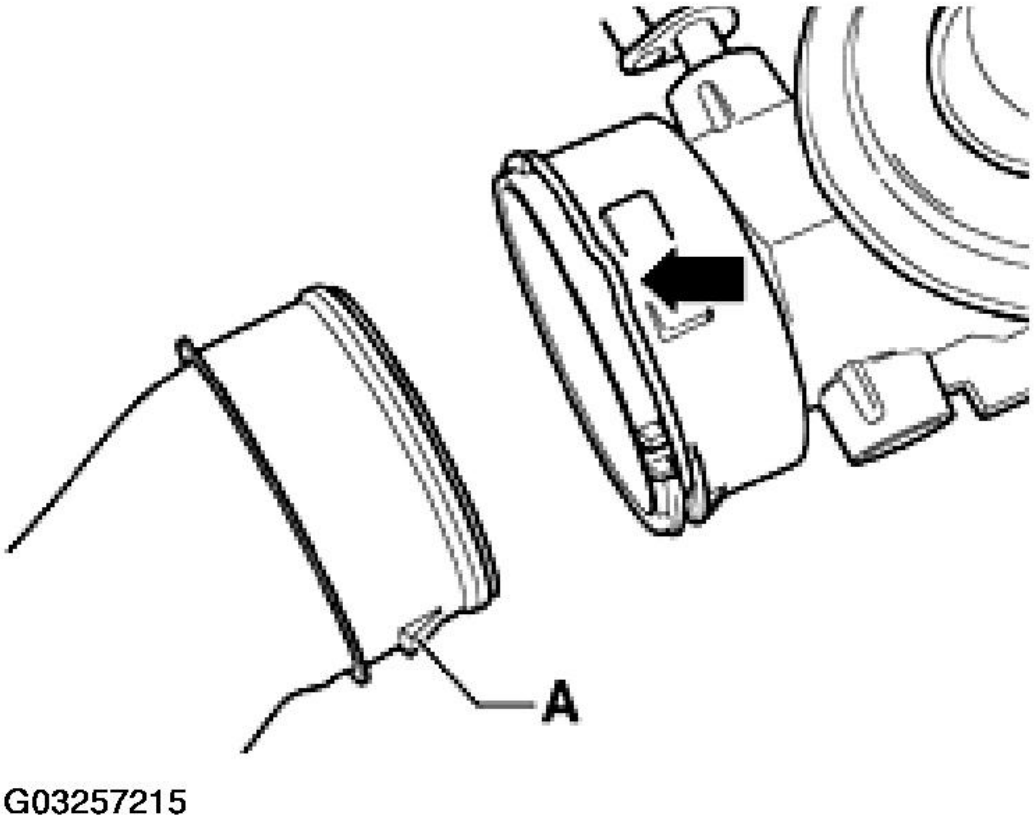


Fig. 2: Unlocking Quick Release Coupling By Pulling Securing Clamp
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- When installing check for secure fit of tabs -A-.

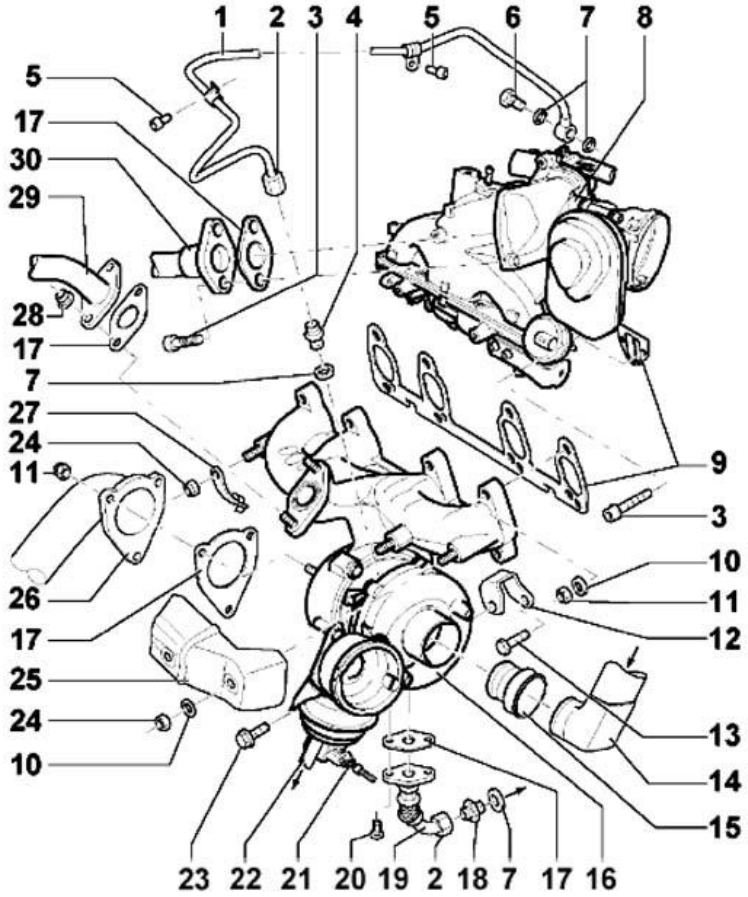
NOTE: The following list refers to items in Fig. 3 .

1. **Oil supply line**
   - From oil filter bracket. See **PART 2: DISASSEMBLING OIL FILTER BRACKET** .
   - Fill with engine oil through oil connection before connecting oil supply line.
   - Removing and installing, See **PART 3: REMOVING AND INSTALLING OIL RETURN LINE** .
2. **Union nut**
   - Prescribed torque, see **PART 3: REMOVING AND INSTALLING OIL RETURN LINE** .
3. **22 N.m**
4. **Pipe union, 30 N.m**
   - Always replace
   - Oil threads and contact surfaces with G 052 112 A3.
   - Fill with engine oil through oil connection before connecting the oil supply line.
5. **Bolt/screw**
   - Prescribed torque, See **PART 3: REMOVING AND INSTALLING OIL RETURN LINE** .
6. **Banjo bolt**
   - Prescribed torque, See **PART 3: REMOVING AND INSTALLING OIL RETURN LINE** .
7. **Seal**
   - Always replace
8. **Intake manifold**
9. **Seal**
   - Always replace
   - Note installed position.
10. **Washer**
11. **25 N.m**
    - Always replace
12. **Bracket**
    - Between turbocharger and cylinder block
13. **40 N.m**
    - Hand-tighten all bolts first
14. **Connecting line**
    - Air filter/turbocharger
15. **Transition piece**
16. **Turbocharger**
    - Only replace as assembly
    - Removing: remove right axle shaft at transmission:

      See **FRONT AXLE SHAFT** .

- Allow engine to run for approx.1 minute at idling speed after installing turbocharger; to ensure oil supply is guaranteed, do not rev up immediately

17. **Seal**
    - Always replace
18. **Pipe union, 40 N.m**
19. **Oil return line**
    - To cylinder block
20. **17 N.m**
21. **Connector**
    - For Turbocharger (TC) Vane Position Sensor -G500-
22. **Vacuum hose**
    - to Wastegate Bypass Regulator Valve -N75-
    - Vacuum hoses for connection diagram, See **VACUUM HOSE CONNECTION DIAGRAM** .
23. **20 N.m**
    - Hand-tighten all bolts first
24. **20 N.m**
    - Always replace
25. **Heat shield**
26. **Front exhaust pipe**
27. **Bracket**
    - For oil return line item 1
28. **22 N.m**
    - Always replace
29. **Connecting line**
    - To bypass flap for exhaust gas recirculation, see **EXHAUST GAS RECIRCULATION SYSTEM COMPONENTS, REMOVING AND INSTALLING** .
30. **Connecting line**
    - From bypass flap for exhaust gas recirculation, see **EXHAUST GAS RECIRCULATION SYSTEM COMPONENTS, REMOVING AND INSTALLING** .



1 - Oil supply line
2 - Union nut
3 - 22 Nm
4 - Pipe union, 30 Nm
5 - Bolt/screw
6 - Banjo bolt
7 - Seal
8 - Intake manifold
9 - Seal
10 - Washer
11 - 25 Nm
12 - Bracket
13 - 40 Nm
14 - Connecting line
15 - Transition piece
16 - Turbocharger
17 - Seal
18 - Pipe union, 40 Nm
19 - Oil return line
20 - 17 Nm
21 - Connector
22 - Vacuum hose
23 - 20 Nm
24 - 20 Nm
25 - Heat shield
26 - Front exhaust pipe
27 - Bracket
28 - 22 Nm
29 - Connecting line
30 - Connecting line

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Fig. 3: Exploded View Of Turbocharger & Intake Manifold Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

CHARGE AIR COOLING COMPONENTS, REMOVING AND INSTALLING

Observe safety precautions, See **CHARGE AIR SYSTEM WITH TURBOCHARGER** .

Observe rules for cleanliness, See **RULES FOR CLEANLINESS** .

NOTE: All hoses of the charge air system are secured with hose clips or with quick release couplings. When using quick release couplings the following points must be observed:

- Unlock connection by pulling securing clamp (arrow).

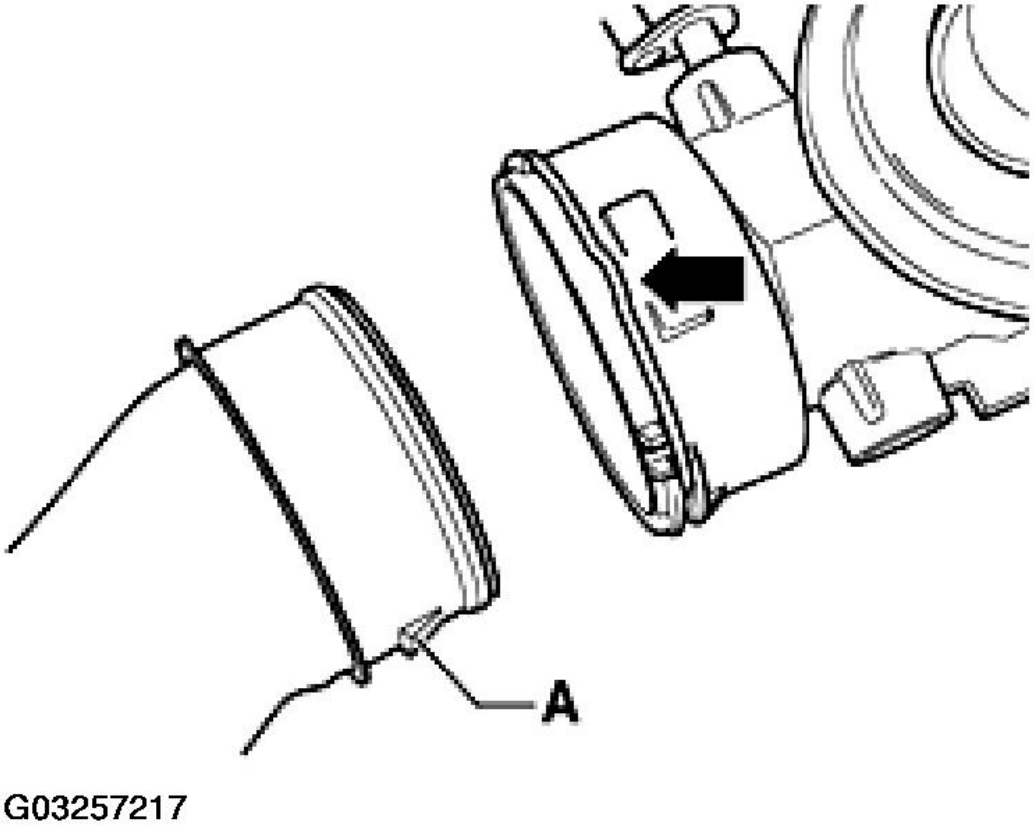


Fig. 4: Unlocking Connection By Pulling Securing Clamp
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove hose/tube without assistance of tools.
- When installing check for secure fit of tabs -A-. See **Fig. 4** .
- Use assembly tool VAS 5024 A to install spring-type clips.

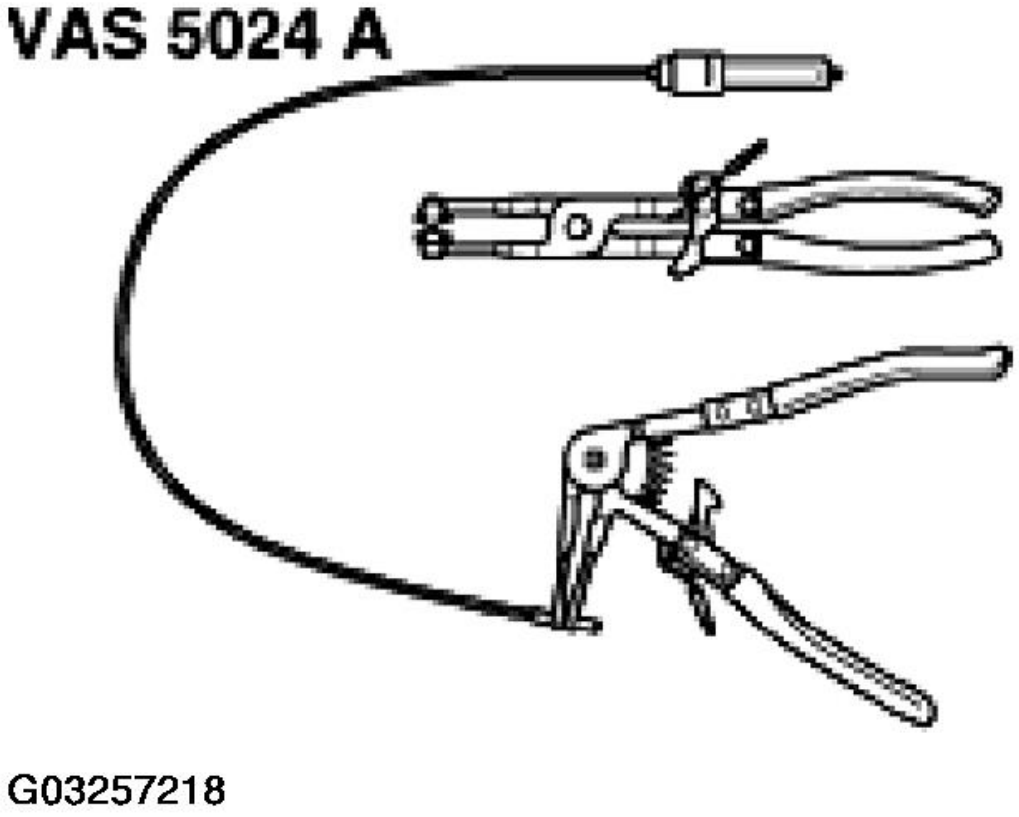


Fig. 5: Installing Spring-Type Clips Using VAS 5024 A Assembly Tool
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE:

- **Charge air hoses and lines connections must be free of oil and grease before reinstalling.**
- **Do not install hoses with lubricants, moisten hose only with water, if necessary.**
- **Charge air system must be free of leaks.**

NOTE: The following list refers to items in Fig. 6 .

1. **Air duct**
2. **Charge air cooler**
   - Removing and installing, See **CHARGE AIR COOLER, REMOVING AND INSTALLING**
3. **5 N.m**

4. **Manifold Absolute Pressure (MAP) sensor -G71- with Intake Air Temperature (IAT) sensor -G72-**
5. **O-ring**
    - Replace if damaged.
6. **10 N.m**
7. **Tube connection piece**
8. **Upper charge air pipe**
9. **Connecting hose**
    - Upper charge air pipe/intake manifold flap
10. **To intake manifold flap**
11. **From air cleaner**
12. **From crankcase ventilation/ cylinder head cover**
13. **Rear charge air line**
    - With Positive Crankcase Ventilation (PCV) heating element -N79-
14. **Connecting hose**
    - Rear charge air pipe/exhaust turbocharger
15. **Bracket**
16. **Connecting hose**
    - Exhaust turbocharger/lower charge air line
17. **Turbocharger**
18. **Lower charge air pipe**

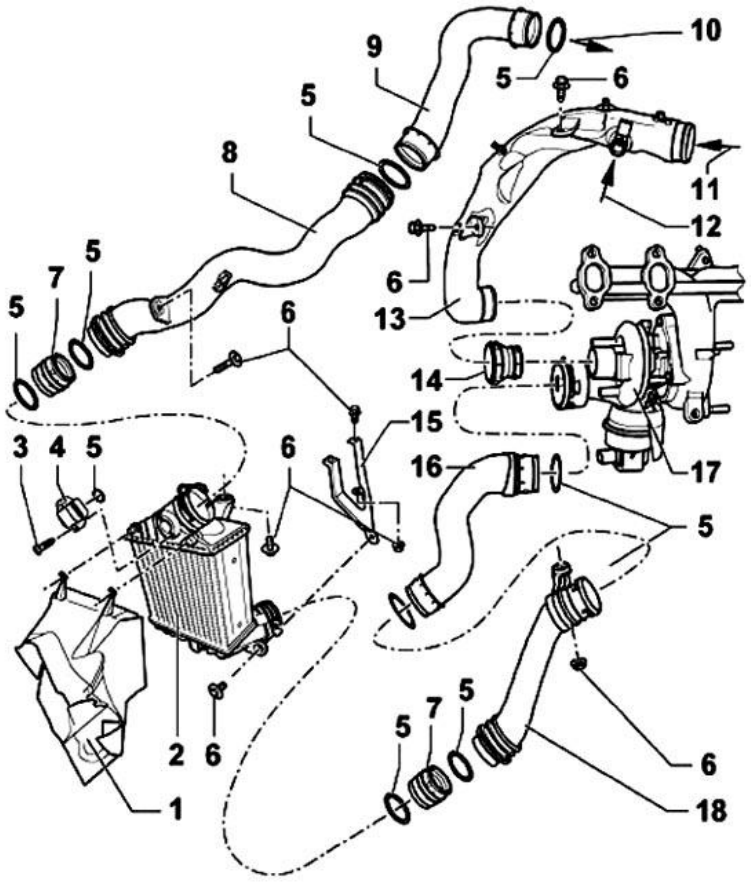
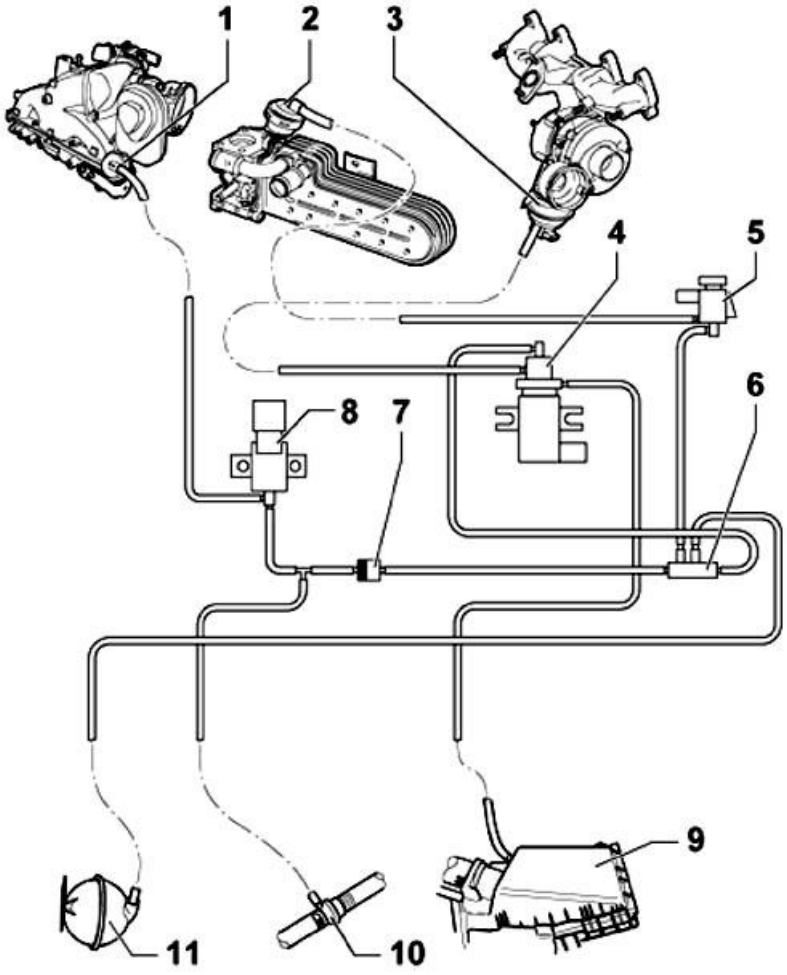


Fig. 6: Exploded View Of Charge Air Cooler Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

VACUUM HOSE CONNECTION DIAGRAM

NOTE: The following list refers to items in Fig. 7 .

1. **Vacuum unit**
   - For variable intake manifold
2. **Vacuum unit**
   - For bypass flap for exhaust gas recirculation cooler
3. **Vacuum unit**
   - For charge pressure control
   - Integral part of turbocharger cannot be replaced
4. **Intake Manifold Runner Control (IMRC) valve -N316-**
   - Installed position, See **Fig. 8**
5. **Non-return valve**
   - White connection to distributor, item 8
6. **Wastegate bypass regulator valve N75-**
   - Installed position, See **Fig. 8**
7. **Exhaust Gas Recirculation (EGR) cooler switch-over valve -N345-**
   - Installed position, See **Fig. 8**
8. **Distributor**
9. **Air cleaner**
10. **Vacuum union**
    - Between tandem pump and brake booster
    - With non-return valve
11. **Vacuum reservoir**



1 - Vacuum unit
2 - Vacuum unit
3 - Vacuum unit
4 - Intake Manifold Runner Control (IMRC) valve - N316-
5 - Non-return valve
6 - Wastegate bypass regulator valve N75-
7 - Exhaust Gas Recirculation (EGR) cooler switch-over valve -N345-
8 - Distributor
9 - Air cleaner
10 - Vacuum union
11 - Vacuum reservoir

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Fig. 7: Turbocharger Vacuum Hose Connection Diagram
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Solenoid valves, installed position

The bracket with the solenoid valves is installed onto plenum chamber sealing cover right side.

The valve connectors are not coded, only the protective sleeves are different.

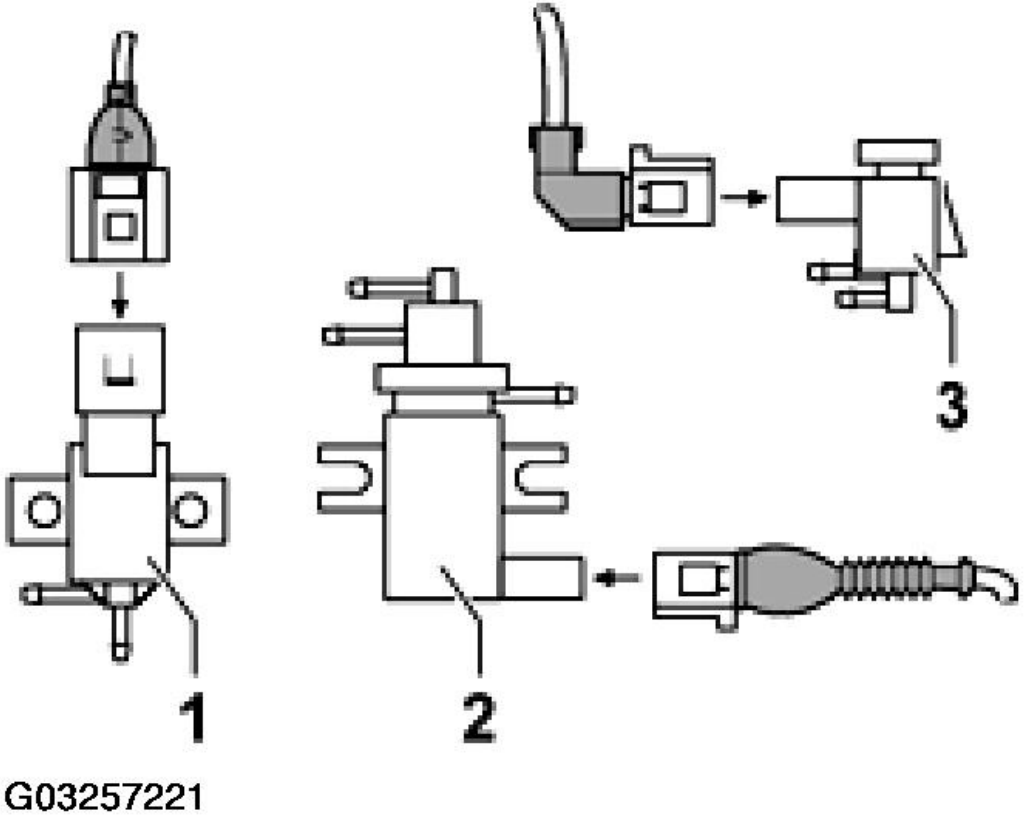

Fig. 8: Identifying Solenoid Valves Installed Position
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Connector application

SOLENOID VALVE CONNECTOR APPLICATION

No.	Component	(1) Connector
1	Intake Manifold Runner Control (IMRC) Valve -N316-	with straight protective sleeve
2	Wastegate Bypass Regulator Valve -N75-	with rubber grommet
3	Exhaust Gas Recirculation (EGR) Cooler Switch-over Valve -N345-	with angled protective sleeve
(1) To identify connectors, see **Fig. 8** .		

CHARGE AIR COOLER, REMOVING AND INSTALLING

Removing

- Remove upper charge air pipe -1- with connecting hose -2- by removing bolt/screw -3- and releasing connector (arrow).

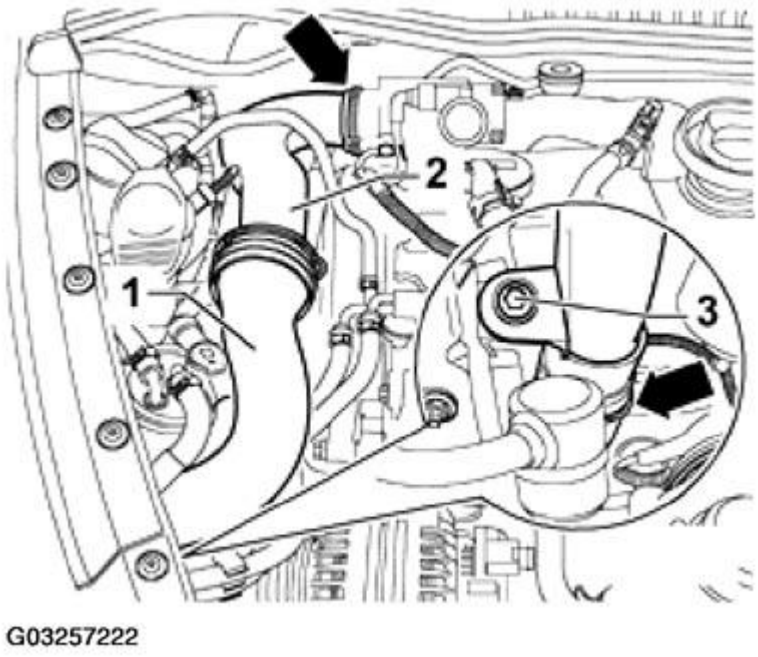

Fig. 9: Removing Upper Charge Air Pipe With Connecting Hose By Removing Bolt/Screw And Releasing Connector
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove front turn signal, right side.

  See **FRONT TURN SIGNAL LIGHTS, REMOVING AND INSTALLING** .

- Disconnect connector (arrow) from Manifold Absolute Pressure (MAP) sensor -G71- with Intake Air Temperature (IAT) sensor -G72-.
- Remove front right wheelhouse liner.

  See **FRONT WHEEL HOUSING LINER, ASSEMBLY OVERVIEW**

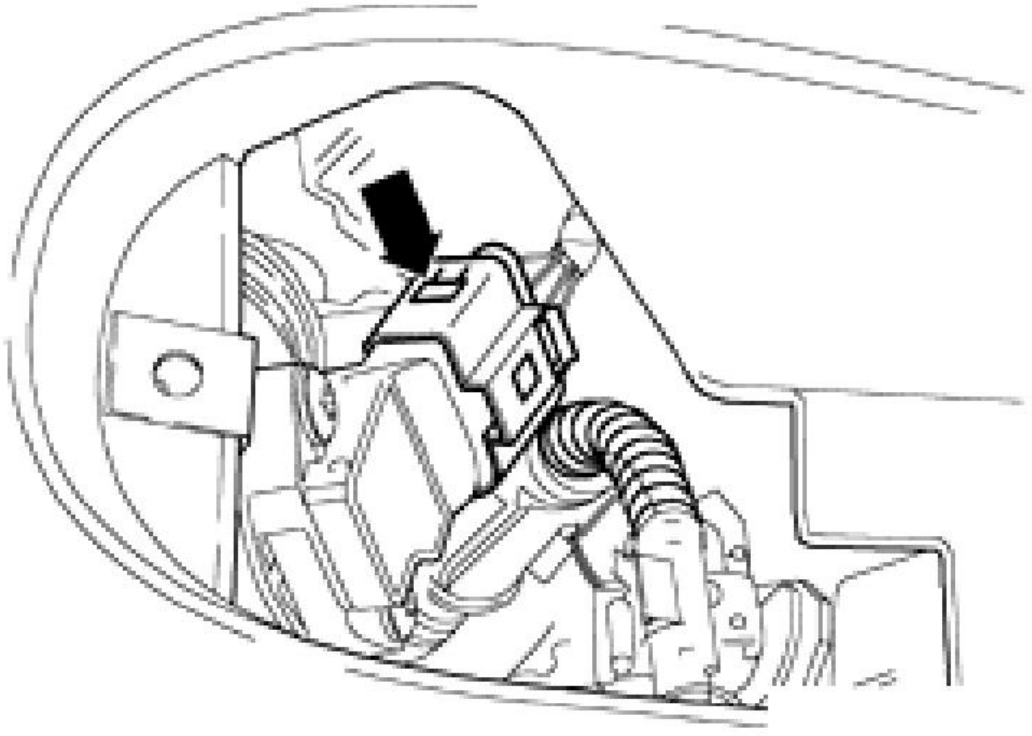

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Fig. 10: Disconnecting Connector From Manifold Absolute Pressure Sensor
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove lower charge air pipe -1-.
- Remove bolt/screw -2- and release connector (arrow).

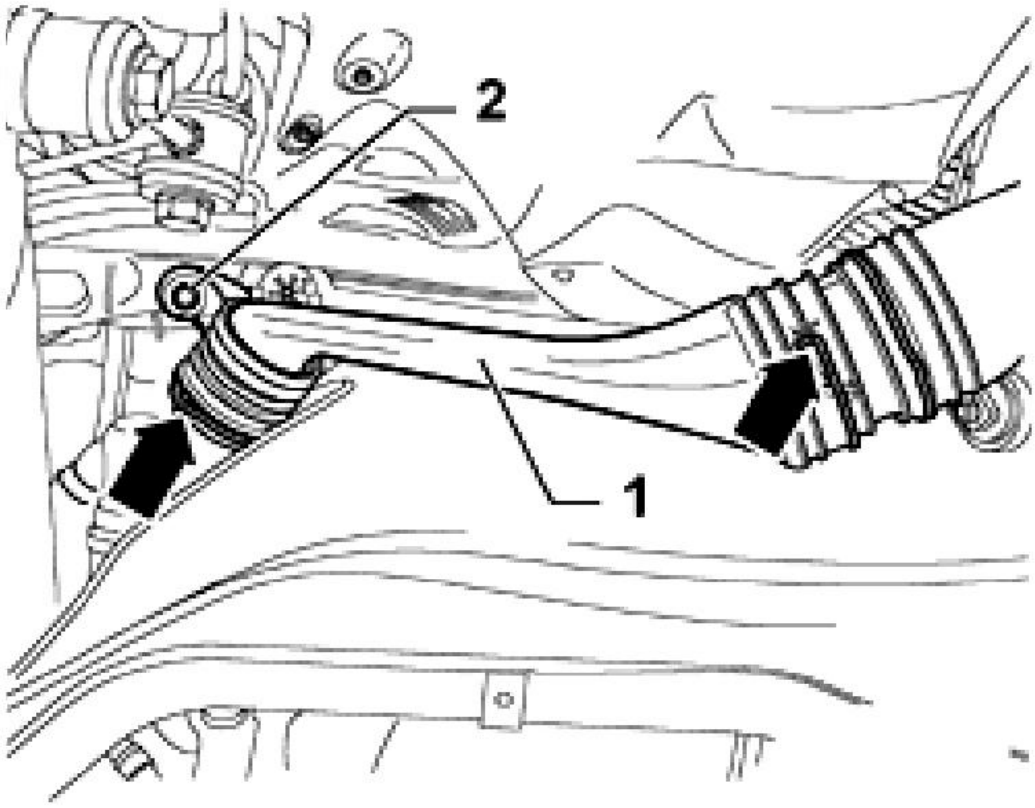

Fig. 11: Removing Lower Charge Air Pipe
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove center and right side sound insulation.
- Remove charge air cooler securing bolts (arrows).

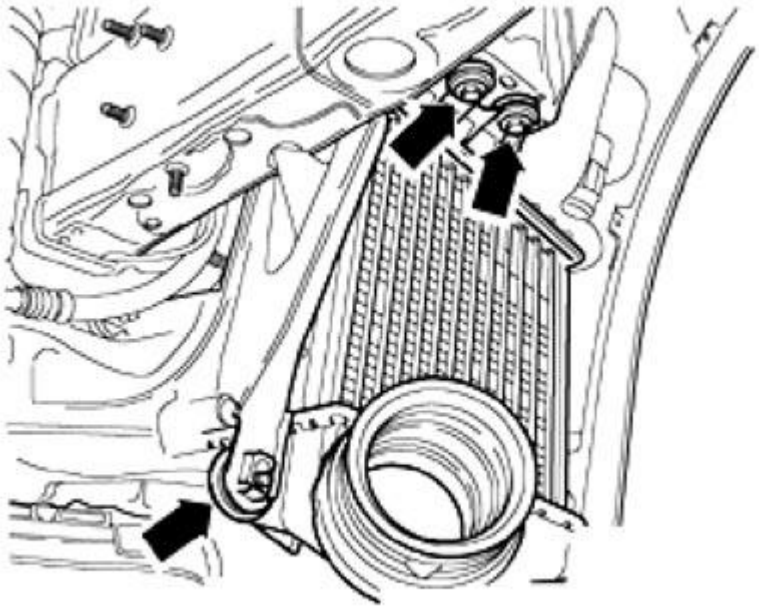

Fig. 12: Removing Charge Air Cooler Securing Bolts
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installing

Install in reverse order.